Which variables have the most impact on South Africa's squid fishery in a changing climate?

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Loligo reynaudii or "Chokka Squid" supports a commercial jig fishery and is the 3rd largest fishery in South Africa. As a fast-growing species with a rapid population turnover, it is able to quickly respond to a changing environment. The fishery occurs mainly off the Agulhas Bank shelf — one of the most diverse, complex and highly variable environments with changing sea conditions expected to directly impact the resource. In this study, we investigate variables affecting the occurrence of chokka squid, and therefore have the most impact on the resource in a changing climate. The variables investigated included environmental (temperature, dissolved oxygen, turbidity, depth), time (time of day, season), location (longitude, region) and stock (adult and juvenile). Generalized additive models (GAMs) were used to test the effect of these covariates on data collected from routine research trawl surveys. Results show mean Loligo catches were highest in autumn in shallow waters and lowest in autumn in deep waters. GAM results showed that for all years, depth, total trawl catch, and most importantly, turbidity were significant covariates. Location, in terms of region was important for all categories but explained very little of the variation, while oceanographic province was important for all squid and adults but not juveniles. Temperature was a significant covariate for adult squid but not juveniles and oxygen was a significant covariate for juveniles but not adult squid. The final model showed that Loligo catches were highest between depths of 60 to 120m, with bottom turbidity of <2.0NTUs (0.035ml-1 PMCturb) in locations between 20 and 23 °E in the western to central Agulhas Bank when total trawl catches did not exceed 1 metric ton. Incorporating the effects of these covariates and their underlying relationships into a regional oceanographic model (ROMS) will improve our forecasting techniques for squid catches to better manage this important resource under a changing climate.